

Spot Safety Project Evaluation

Project Log # 200409021

Spot Safety Project # 04-97-008

**Spot Safety Project Evaluation, of the Flashing Traffic Signal Installation,
At the Intersection of NC 55 and SR 1948-Camp Jubilee Road in Wayne County**

Documents Prepared By:

Safety Evaluation Group
Traffic Safety Systems Management Section
Traffic Engineering and Safety Systems Branch
North Carolina Department of Transportation

Principal Investigator

Carrie L. Goodrich

Traffic Safety Project Engineer

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Date

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 04-97-008 – The Intersection of NC 55 and SR 1948-Camp Jubilee Road in Wayne County

Introduction

In an attempt to assess the safety of our roads, the Safety Evaluation Group of the Traffic Safety Systems Management Section has evaluated the above project. The methodologies used in this evaluation offer various philosophies and ideas, in an effort to provide objective countermeasure crash reduction results. A naive before and after analysis and an odds ratio comparison analysis has been completed to measure the effectiveness of the spot safety improvement. This information is provided to you so the benefit or lack of benefit for this type of project can be recognized and utilized for future projects.

Project Information and Background from the Project File Folder

The spot safety project improvement countermeasures chosen for the subject location were the installation of a flashing traffic signal and minimal commercial channelization in the southeast corner quadrant of the intersection at O'Quinns Variety Store. Phillip A. Baddour Jr., from the North Carolina House of Representatives, originally requested the improvements. Both NC 55 and SR 1948-Camp Jubilee Road are two lane facilities with a speed limit of 55 mph. SR 1948-Camp Jubilee Road is stop sign controlled at the intersection with NC 55. It was felt that Angle crashes occurred due to motorists' failure to obey the existing traffic control devices. In addition, vehicles parking at O'Quinns Variety Store created poor entering sight distance for vehicles on the south leg of the intersection. The initial crash analysis for this location was completed from March 1, 1991 through February 28, 1997 with a total of 23 reported crashes. There was one Ran-Off-Road Crash, six Rear-End Crashes, two Left-Turn Crashes, one Right-Turn Crash, one Head-On Crash, and twelve Angle Crashes. Two fatalities resulted. The final completion date for the improvement at the subject intersection was on February 18, 1998.

Comparison Analysis

After reviewing the spot safety project file folder along with all the crashes at the subject location, the crash data omitted from this analysis to consider for an adequate construction period was from January 1, 1998 through March 31, 1998. The before period consisted of reported crashes from April 1, 1992 through December 31, 1997 (5 Years, 9 Months) and the after period consisted of reported crashes from April 1, 1998 through December 31, 2003 (5 Years, 9 Months). The ending date for this analysis was determined by the available crash data at the time the crash analysis was completed.

The analysis also consisted of two different sets of data, the treatment and the comparison data. The treatment data consisted of all crashes within 150 feet of the subject intersection. The comparison data consisted of all crashes within 150 feet of the intersections of NC 55 and SR 1744-Indian Springs Road, NC 55 and SR 1937-Kelly Springs Road, and NC 55 and SR 1932-Emmaus Church Road. Please see attached *Location Map* for further detail. The following data table depicts the Naive Before and After Analysis for the treatment and comparison intersections. Please note that Frontal Impact Crashes and Angle Crashes were the target crashes for the applied countermeasure. The Frontal Impact Crash types considered are as follows: Left turn, same roadway; Left turn, different roadways; Right turn, same roadway; Right turn, different roadways; Head on; and Angle.

Treatment Information

	Before	After	Percent Reduction (-)/ Percent Increase (+)
Total Crashes	28	26	- 7.1
Total Severity Index	9.59	6.41	- 33.2
Frontal Impact Crashes	21	22	4.8
Frontal Severity Index	12.10	6.72	- 44.5
Angle Crashes	16	14	- 12.5
Angle Severity Index	13.71	6.81	- 50.3
Volume	3400	4700	38.2

Comparison Information

	Before	After	Percent Reduction (-)/ Percent Increase (+)
Total Crashes	18	35	94.4
Total Severity Index	5.52	11.73	112.5
Frontal Impact Crashes	10	26	160.0
Frontal Severity Index	7.66	10.82	41.3
Angle Crashes	8	21	162.5
Angle Severity Index	7.47	12.80	71.4
Volume	4200	5200	23.8

Odds Ratio: Treatment versus Comparison

	Before	After	Percent Reduction (-)/ Percent Increase (+)
Treatment Total Crashes	28	26	---
Comparison Total Crashes	18	35	- 52.2 %
Treatment Frontal Impact Crashes	21	22	---
Comparison Frontal Impact Crashes	10	26	- 59.7 %
Treatment Angle Crashes	16	14	---
Comparison Angle Crashes	8	21	- 66.7 %

The naive before and after analysis at the treatment location resulted in a 7.1 percent decrease in Total Crashes, a 33.2 percent decrease in the Total Severity Index, and a 38.2 percent increase in Average Daily Traffic (ADT). The comparison locations resulted in a 94.4 percent increase in Total Crashes, a 112.5 percent increase in the Total Severity Index, and a 23.8 percent increase in ADT. The before period ADT year was 1995 and the after period ADT year was 2001.

The Odds Ratio is used as another means of calculating the treatment effect. The total crashes in the before and after period from the Comparison Strip are used to calculate the percent reduction in total crashes for the Treatment Intersection. As shown in the previous table, using the Odds Ratio calculation, there is a 52.2 percent decrease in Total Treatment Intersection crashes, a 59.7 percent decrease in Frontal Impact Treatment Intersection crashes, and a 66.7 percent decrease in Angle Treatment Intersection crashes.

The attached data Table 1 depicts the Naive Before and After Analysis for the above information. The data in Tables 1 consists of an overall crash summary and a crash type summary for the treatment intersection. The overall crash summary contains high level crashes, crash rates, and vehicle exposure statistics. The crash type summary contains crashes broken down by accident type. Before period crash data, after period crash data, and the percent change in crashes from the before to the after period are also included.

Results and Discussion

The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 7.1 percent decrease in Total Crashes, a 4.8 percent increase in Frontal Impact Crashes, and a 12.5 percent decrease in Angle Crashes. Using the Odds Ratio to calculate the treatment effect resulted in a 52.2 percent decrease in Total Crashes, a 59.7 percent decrease in Frontal Impact Crashes, and a 66.7 percent decrease in Angle Crashes at the Treatment Intersection. The summary results above demonstrate that the treatment location appears to have had a decrease in the number of Total Crashes from the before to the after period. In addition, using

the Odds Ratio analysis method, the treatment location appears to have had a substantial crash reduction in all crash types from the before to the after period.

The Severity Index for Total Crashes, Frontal Impact Crashes, and Angle Crashes at the treatment intersection decreased by 33.2 percent, 44.5 percent, and 50.3 percent, respectively. In the before period, there was one fatal crash at the subject location. Prior to the before period (in November 1991) there was another fatal crash at this intersection. Both were Angle Crashes involving southbound and eastbound vehicles. Although the severity of crashes in the after period has decreased, the number of injury crashes has increased. Eleven of the nineteen injury crashes in the after period were Angle Crashes.

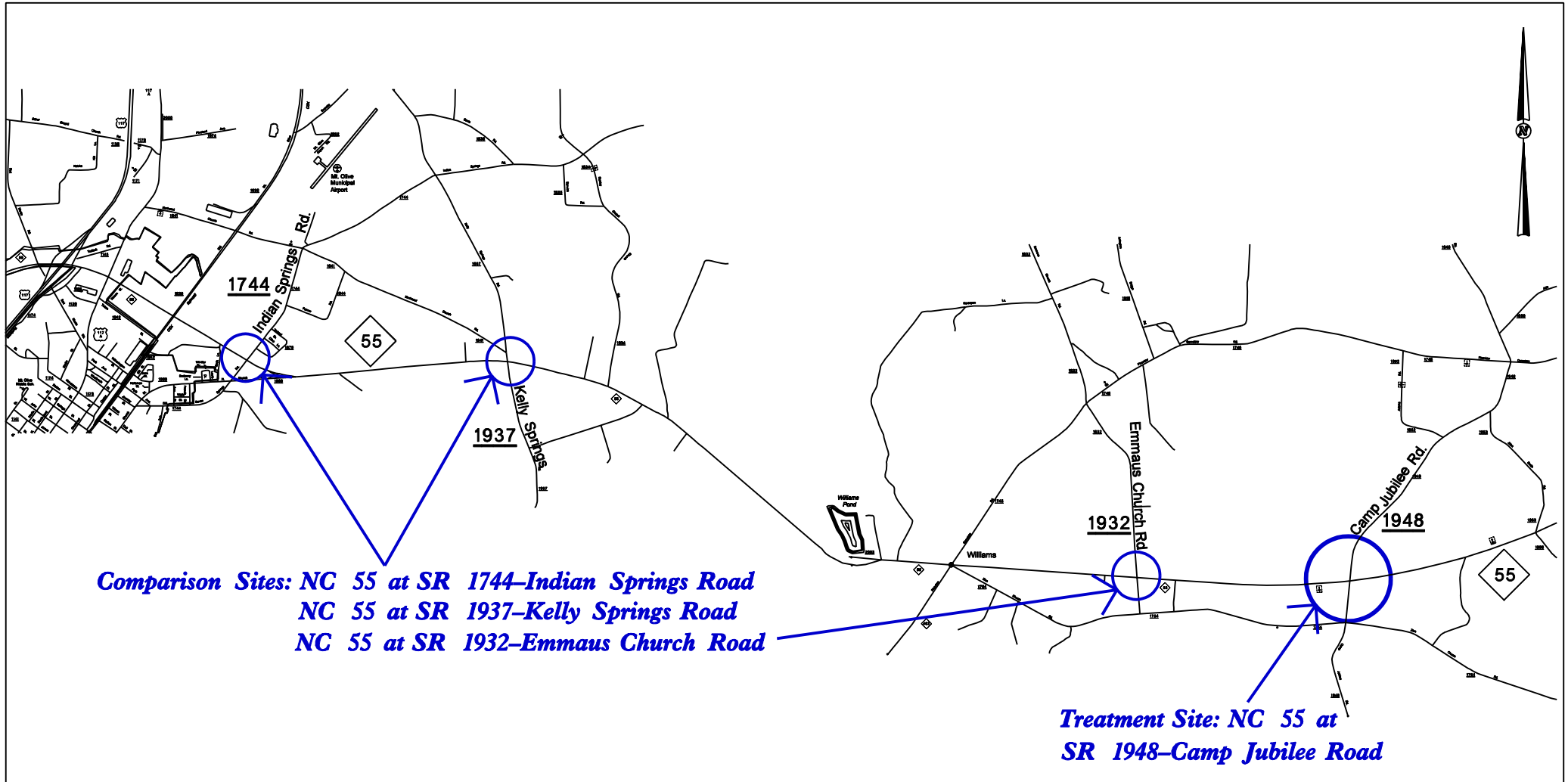
Please see the attached Treatment Site Photo. The photo was taken looking south towards the treatment intersection. O'Quinns Variety Store is visible in the southeast quadrant of the intersection. There is very minimal commercial channelization provided. Also note the dually erected stop signs on both approaches of SR 1948-Camp Jubilee Road.

The countermeasure crash reduction for Total Crashes at the subject intersection can be in the range of a 7.1 percent decrease to a 52.2 percent decrease in crashes. The countermeasure crash reduction for Frontal Impact Crashes at the subject intersection can be in the range of a 4.8 percent increase to a 59.7 percent decrease in crashes. The countermeasure crash reduction for Angle Crashes at the subject intersection can be in the range of a 12.5 percent decrease to a 66.7 percent decrease in crashes. As the Safety Evaluation Group completes additional spot safety reviews for this type of countermeasure, we will be able to provide objective and definite information regarding actual crash reduction factors.

Table 1. Treatment Area Overall Crash Summary and Crash Type Summary

OVERALL CRASH SUMMARY	Before Period	After Period	Percent Change
Total Crashes	28	26	-7.1
Fatal Crashes	1	0	-100.0
Non-Fatal Injury Crashes	13	19	46.2
Total Injury Crashes	14	19	35.7
PDO Crashes	14	7	-50.0
Night Crashes	8	7	-12.5
Wet Crashes	5	1	-80.0
Total Crash Rate	391.97	263.3	-32.8
Fatal Crash Rate	14	0	-100.0
Non Fatal Crash Rate	181.99	192.41	5.7
Night Crash Rate	111.99	70.89	-36.7
Wet Crash Rate	69.99	10.13	-85.5
Annual ADT	3400	4700	38.2
Total Vehicle Exposure	7.14	9.87	38.2
Severity Index	9.59	6.41	-33.2
CRASH TYPE SUMMARY	Before Period	After Period	Percent Change
Angle	16	14	-12.5
Backing Up	0	1	n/a
Fixed Object	1	0	-100.0
Head On	1	0	-100.0
Left Turn, Different Roadways	0	1	n/a
Left Turn, Same Roadway	3	7	133.3
Ran Off Road - Left	1	0	-100.0
Rear End, Slow or Stop	5	3	-40.0
Right Turn, Different Roadways	1	0	-100.0

***Location Map, Wayne County
Evaluation of Spot Safety Project Number 04-97-008***

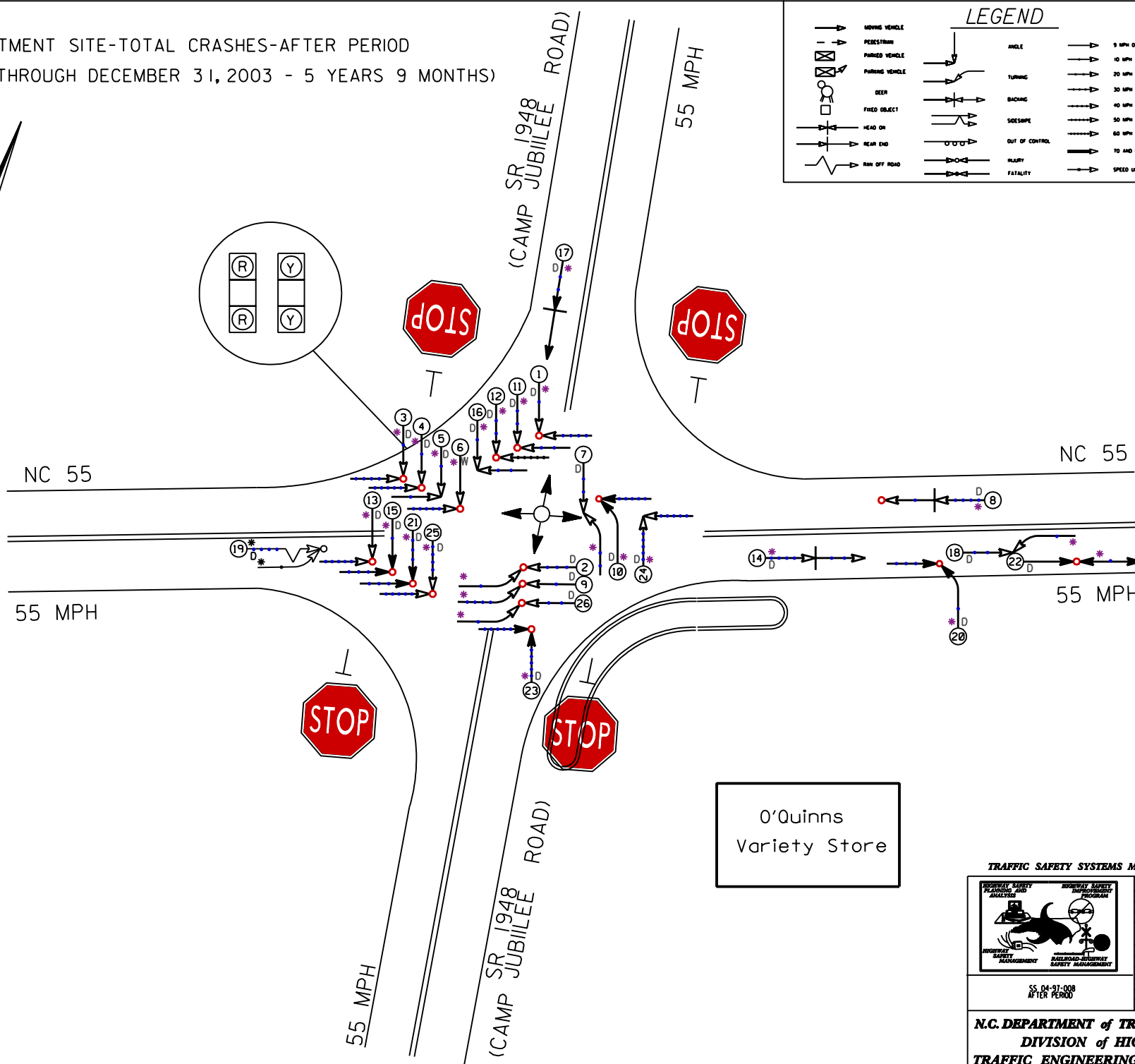


Treatment Site Photo (Taken on September 2, 2004)



Looking south on SR 1948-Camp Jubilee Road
Notice O'Quinns Variety Store in the southeast quadrant of the intersection

TREATMENT SITE-TOTAL CRASHES-AFTER PERIOD
(APRIL 1, 1998 THROUGH DECEMBER 31, 2003 - 5 YEARS 9 MONTHS)



LEGEND			
	MOVING VEHICLE		ANGLE
	PEDESTRIAN		9 MPH OR LESS
	PAKED VEHICLE		10 MPH TO 19
	PAKED VEHICLE		20 MPH TO 29
	DEER		30 MPH TO 39
	FIXED OBJECT		40 MPH TO 49
	HEAD ON		50 MPH TO 59
	REAR END		60 MPH TO 69
	RUN OFF ROAD		70 MPH TO 79
			80 MPH TO 89
			90 MPH TO 99
			100 MPH TO 109
			110 MPH TO 119
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